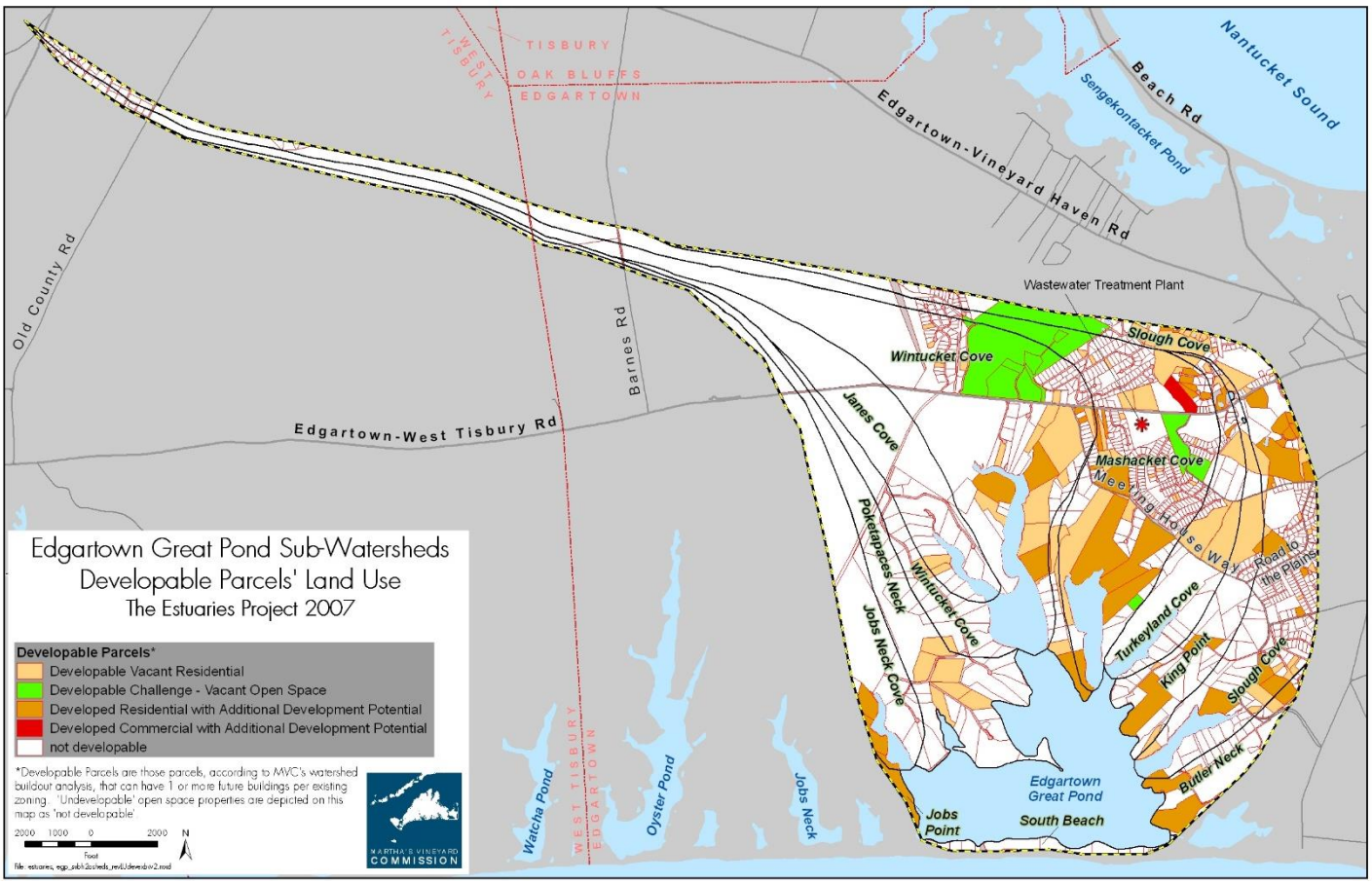
MARTHA'S VINEYARD COASTAL PONDS FACT SHEET

HIGHLIGHTS OF THE MASSACHUSSETTS ESTUARIES PROJECT REPORT

Edgartown Great Pond

In 2008, the Massachusetts Estuaries Project (MEP) published its study of the Edgartown Great Pond, located on Martha's Vineyard. The following are highlights from this study, prepared by staff of the Martha's Vineyard Commission. This should be read in conjunction with *"Highlights of the MEP: Nitrogen Loading in Coastal Ponds"* which explains some of the process and technical terms referred to in this summary.



1. The Pond and the Watershed

- The Edgartown Great Pond is 890 acres (high pond), entirely in the Town of Edgartown
- The Pond's watershed is about five times greater than the pond, namely 4,505 acres, almost completely in Edgartown and the rest in West Tisbury
- The watershed is made up of twelve sub-watershed areas, each discharging to the coves within the great pond, and then into the pond's main basin, made up of the upper basin and lower basin, north and south of Swan Neck

2. Current Water Quality

Generally, the water quality in the pond shows a moderate level of habitat impairment, as shown in Table 1 on the next page. The water quality is often worse in the coves, because they are shallower, have less tidal flushing, and are closer to the sources of nitrogen inputs.

The following are the MEP ratings based on key parameters.

- **Dissolved Oxygen:** The table below shows the percentage of time dissolved oxygen stayed above the acceptable limit of 6 ppm.
- **Pond-Bottom Habitat:** A study was conducted at 15 stations throughout the pond. Upper main basin and the major tributary coves all support the poorest habitats with nitrogen enrichment, while the lower basin and the other coves support slightly higher quality habitat, although still moderately impaired with nitrogen enrichment.
- **Eelgrass:** Eelgrass has nearly disappeared several times in the last ten years. In the upper basins and the major tributary coves, there is no evidence of any eelgrass beds population. However, in the eastern-most and western-most parts of the lower basin, there are small sparse patches of eelgrass beds population.
- **Algae (Chlorophyll):** A continuous record of dissolved oxygen and phytoplankton at 3 locations (Wintucket, West End and Swan Neck Stations) over a 45-day period following a breach indicated that the pond contains too much organic matter with algae exceeding desirable levels about half the time.

Table 1: **Water Quality in Edgartown Great Pond**

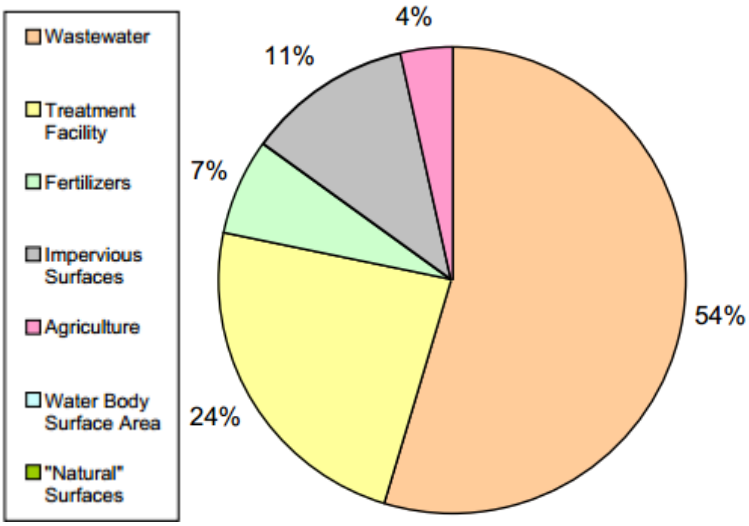
	Dissolved Oxygen (above acceptable limit)	Habitat Rating (degree of impairment)	Existence of Eelgrass Beds	Algae (degree of impairment)
Major Tributary Coves*	94%	Significant-Moderate	No	Moderate
Other Coves	91%	Moderate	No	Moderate
Upper Basin	94%	Significant-Moderate	No	Moderate
Lower Basin	92%	Moderate	Yes	Moderate

**Includes Janes Cove, Wintucket Cove and Mashacket Cove*

Table 2: **Sources of Nitrogen Loading to Edgartown Great Pond**

Sources of Nitrogen Loading	**Today** (2007)			**Buildout**		
	Amount (kg/y)	**Share of Manageable Load**	**Share of Total Load**	**Amount** (kg/y)	**Share of Manageable Load**	**Share of Total Load**
Septic Systems (WW)	5,536	33%	27%	12,469	45%	39%
Treatment Facility (WW)	2,404	14%	12%	1,707	6%	5%
Fertilizer – Lawn Use	659	4%	3%	979	4%	3%
Fertilizer – Agricultural Use	368	2%	2%	313	1%	1%
Runoff	1,157	7%	6%	1,511	5%	5%
Sediment Release	6,627	40%	32%	10,786	39%	34%
Manageable Total	**16,751**	**100%**	**80%**	**27,765**	**100%**	**87%**
Atmospheric Deposition	4,068		20%	4,068		13%
Total Load	**20,819**		**100%**	**31,833**		**100%**

3. Current and Projected Nitrogen Loading



Sources of the Manageable Nitrogen Load

Sources of Nitrogen

Current sources of nitrogen are shown in the Table 2 on the opposite page, which shows both the *Manageable and Total Loads*. The full MEP report gives detail by sub-watershed.

The future scenario is based on buildout as allowed by existing zoning, which permits 1,059 additional dwellings and development of 21.7 acres of commercial land. This is reflected in additional wastewater and fertilizer application, resulting in an increase in nitrogen loading from the watershed of 62% at buildout.

- **Septic Systems (Wastewater):** Based on the 2000 Census, MEP estimate that the nitrogen contributed by on-site septic systems using average per capita water usage results in 54% of the watershed's manageable load.
- **Treatment Facility (Wastewater):** The remaining properties in the watershed have their wastewater treated at the Edgartown Wastewater Treatment Facility, contributing 24% of the load. The MEP estimated that the lower-nitrogen plume from resulting from the plant construction would reach the pond a few years of report completion.
- **Fertilizer Application:** Fertilizer from residential lawns, a golf club and agriculture represents 11% of the overall contribution of nitrogen. This is based on established loading rates, lawn size, acres of measured golf turf and agricultural fields, and number of livestock. A leaching rate to groundwater of 20% is used.
- **Runoff:** Precipitation and other water sources traveling on impervious surfaces (i.e. asphalt, concrete, rooftops, etc.) goes directly into the pond carrying nitrogen with no treatment, resulting in 11%.
- **Atmospheric Deposition:** Acid rain deposits nitrogen from polluted air, largely from upwind coal-fired power plants and other industrial sources off-Island.
- **Buildout:** The projections are based on the assessment of minimum lot sizes under current zoning, potential additional development (residential and commercial) on existing developed lots, and local guesthouse regulations. It also includes estimated additions of the WWTF reaching design flow capacity and anticipated reductions in farm fertilizers due to future development

Tidal Flushing

The pond is only tidally connected to the Atlantic Ocean for short periods of time (average of 12 days) during man-made breaches. Tidal circulation replaces half of the water in the pond every 3.7 days during an opening. Currently, the barrier beach separating the pond from the ocean is breached three times per year. Opening of the great pond was initiated in the 1940's and would have been required then as well as today for shellfish, alewives and water quality. The fact that the beach is not breached during the summer allows nitrogen concentrations to rise to a very high level by the middle of the summer, reaching a concentration of 0.895 parts per million (ppm), well over the target described in the next section.

4. Goal and Nitrogen Limits

Goal

For the Edgartown Great Pond, the MEP set the goal of restoring and maintaining SA waters or high habitat quality. This is defined as supportive of eelgrass and infaunal communities.

Nitrogen Concentration Limits

The current overall nitrogen loading – an average of levels that vary from 0.58 parts per million (ppm) in the lower basin to 0.63 ppm in the coves, going up to 0.65 ppm in upper Mashacket Cove – is:

0.596 ppm.

The MEP sets the target for maximum average total nitrogen concentration at:

0.500 ppm.

Meeting this target requires a 16% reduction to deal with current loads. When this target is reached and maintained, the amount of dissolved oxygen and algae will be acceptable and eelgrass will thrive. A healthy infaunal habitat can clearly be achieved at this level.

Note that an additional reduction will be needed to deal with the projected increase of nitrogen loading in the future as all of the additional load will have to be mitigated.

5. Approaches to Improving Water Quality

The current threshold level can be achieved through a reduction in total nitrogen loading of about 18% coupled with an additional mid-summer breach of the pond. Suggested approaches to reduce the nitrogen concentration in the pond to acceptable levels based on the current situation, in addition to benefiting from the upgrade to the wastewater treatment facility, include the following:

- Reduce nitrogen loading from wastewater with a 30% reduction in the load from septic systems such as by extending the sewer to include more homes presently on septic systems
- Excavate the inlet at 45-day intervals during the summer. This would reduce total nitrogen concentration buildup before an inlet and the decrease nitrogen as pond water leaves the system and is replaced by cleaner ocean water is shown. This would require one additional breach in mid-summer

Another approach is to examine the Best Management Practices for landscape fertilizer use to reduce the nitrogen inputs from the agricultural and lawn fertilizer uses.

Note: These highlights were prepared by MVC staff, which made every attempt to accurately summarize the MEP report. However, for full and accurate information please use the original report, especially for decision making.

The full MEP report on the Edgartown Great Pond is available at:
http://www.mvcommission.org/doc.php/Edgartown_MEP_Final%20with%20exec%20summary.pdf?id=2152

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